DOCUMENT RESUME

ED 244 108 CE 038 940

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TITLE Description of an Introductory Learning Strategies Course for the Job Skills Educational Program.
PUB DATE Apr 84
NOTE 21p.; Presented at the Annual Meeting of the American Educational Research Association (68th, New Orleans, LA, April 23-27, 1984).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Education; *Basic Skills; Computer Assisted Instruction; *Course Descriptions; *Curriculum Development; Goal Orientation; *Learning Strategies; Memory; Military Personnel; *Military Training; Pacing; Problem Solving; Reading Comprehension; Study Skills
IDENTIFIERS *Army; *Job Skills Educational Program

ABSTRACT

The Job Skills Educational Program (JSEP), currently under development for the Army Research Institute, embeds learner strategies training within the context of a basic skills computer-assisted instruction curriculum. The curriculum is designed for low-ability soldiers, and consists largely of instruction in the domain of intellectual skills. An introductory course in the JSEP curriculum contains two major units. The first familiarizes students with the computer system (both Microticcit and Plato versions are being programmed). The second teaches an organizing metastrategy consisting of five general steps that together form an approach for taking each basic skills lesson. The five steps are setting goals and self-pacing, mood management, reading comprehension, developing skilled memory, and problem solving. Each step is presented in a separate module and is introduced by a cartoon character that represents that step. Characters appear repeatedly throughout the curriculum as prompts to recall and use strategies. A brief review unit presents the metastrategy as a coordinated activity, to teach students to modify the metastrategy as a technique for studying at home and taking tests. (A reference list is appended.) (YLB)

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Description of an Introductory Learning Strategies Course for the Job Skills Educational Program

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

The Job Skills Educational Program (JSEP) is a CAI basic skills curriculum currently under development at the Center for Educational Technology, Florida State University, for the Army Research Institute. The curriculum is designed for low-ability soldiers, and will consist largely of instruction in what Gagne' (1977) has called "the intellectual skills domain." A JSEP taxonomy of learner strategies has been developed, and this set of learning strategies will be incorporated into the JSEP curriculum to produce an embedded strategies curriculum. This paper will describe the JSEP strategies training model. The method and theoretical rationale for developing this type of curriculum will be briefly explained, and examples of instruction will be presented.

Most large scale learner strategy training programs have been adjunct study skills courses (Dansereau, 1978; McCombs, 1982; Weinstein, Underwood, Wicker, & Cubberly, 1979), in which strategies acquisition rather than subject learning is the primary aim. By contrast, embedded strategies models (Jones, 1983) offer instruction and practice of strategies totally within the context of a subject-matter curriculum. In the JSEP curriculum, which combines both approaches, selected general domain-specific strategies are taught in an

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introductory course. The forthcoming subject-matter, or basic skills lessons, are designed with prompts that cue the soldiers to recall and use the strategies during learning the content of the lessons. The prompting system will be designed to analyze student response patterns to determine whether or not prompting is needed or should be faded out. The end goal of the model is to have students begin to use strategies spontaneously. The curriculum is designed to engineer extended practice in strategies initiation, and then prompts and reviews can be faded out gradually as more advanced instruction is introduced. This approach is consistent with research on incidental learning (Craik & Lockhart, 1972; Craik & Tulving, 1975), with Sternberg's guidelines for intellectual skills training (1983), and is consistent with what Gagne' (1980) believes about how cognitive strategies are acquired.

Students will begin the JSEP curriculum with an introductory course that includes two major units. The first is a "Welcome to JSEP" unit to familiarize students with the computer system (both Microticcit and Plato versions are being programmed). The second unit, "Learning Skills you need for JSEP," will introduce students to an organizing "metastrategy" (Dansereau, 1978). The JSEP developed metastrategy consists of five general steps that together form an approach for taking each basic skills lesson. The five steps are as follows:

1) Setting Goals and Self-Pacing
2) Mood Management
3) Reading Comprehension
4) Developing Skilled Memory
5) Problem Solving

Each step of the metastrategy will be presented in a separate module, and each will be introduced by a cartoon character which

represents that step. Within each module, the specific, component strategies associated with each step of the metastrategy will be taught by the appropriate cartoon character. It is each of these characters that will appear repeatedly throughout the basic skills lessons, to serve as imagery mnemonic prompts so that students recall and utilize the learning strategies associated with each character prompt. The way the prompting system will operate on the computer will be discussed further in the summary section.

A brief review of each of the modules, the rationale for their inclusion in the learning strategies curriculum, and examples of instruction follows.

JSEP Learning Strategies Curriculum

Module 1: Setting Goals and Self-Pacing

This module's character is an animated cartoon clock. The module includes sections on goal-setting, self-pacing, and self-reinforcement. The goal-setting section will begin with definitions and examples of short and long term goals. The concept of lesson objectives will be discussed as a goal within the JSEP curriculum, and students will be taught to use objectives presented at the beginning of the learning strategy modules and at the beginning of basic skills lessons to guide their progress throughout the lessons. A five step plan (DiFrancesca, 1978; McCombs, 1982) for forming goals will be taught: identifying goals; identifying the behaviors necessary for attaining goals; making a plan for the behaviors; putting the plan in action; and evaluation of the plan. Gagne' (1977) has suggested that formation of goals leads to expectancies, which in turn serve to motivate students to achieve the goal.

In the self-pacing section, two techniques will be emphasized. The first is self-monitoring of time-on-task. The use of random tones on the computer, along with paper and pencil forms which the soldier marks for on-task behavior when the signal sounds, may be incorporated into the module and into basic skills lessons. Self-monitoring has been shown to have an effect on the target behavior, whereby the behavior changes as a function of the monitoring process itself (e.g., Kanfer, 1970; Kazdin, 1974). Also, self-monitoring has been found to be effective for behavior change, even if self-recording is not accurate (Rosenbaum & Drabman, 1979). The second technique is also a form of self-monitoring, and consists of having students keep progress maps to chart their advancement through the basic skills lessons. Dobrovolny, McCombs, & Judd (1980) utilized self-monitoring techniques similar to these and concluded that training in time management resulted in a reduction of training time, therefore lowering training costs.

In the section on self-reinforcement, students will be given examples of appropriate reinforcers and will be taught to make behavioral contracts with themselves. It has been argued that self-reinforcement is one of the most powerful of all self-control procedures, and equal to if not better than external reinforcement techniques (O'Leary & Dubey, 1979). In a review of research on self-reinforcement, Rosenbaum and Drabman (1979) indicated that self-determined contingencies can be as effective, or may be more effective than externally chosen contingencies, since being able to choose one's own contingencies seems to function as a response facilitator.

Module 2: Mood Management

A cartoon character named "Coach" will teach slow deep breathing exercises, positive self-talk, muscle relaxation, and coping imagery in this module. A coach character was chosen to emphasize the importance of self-coaching for mood control. The main goals of the module are to enhance students' feelings of self-efficacy and competence in order to enhance their self-motivation, and to teach techniques for reducing anxiety, especially for test anxious students. The need for these types of strategies has been documented among similar populations. McCombs (1981) found that approximately one fourth of students in the Air Force Advanced Instructional System training performed at an unsatisfactory level due to several problems, which included low interest and motivation, and high anxiety toward the course itself and toward test taking.

The procedure for teaching positive self-talk has been adapted from Meichenbaum's (1977) work, which emphasizes the self-monitoring and cognitive restructuring of maladaptive self-statements. The procedure has been used across a variety of avoidance behaviors and subject samples (e.g., phobics, impulsive children, adult schizophrenics, text anxious students), and has been found to be useful. Sarason (1973) has reported that there is considerable evidence that high test-anxious students are usually self-deprecating and ruminative in an evaluation situation. Wine (1971) and Tobias (1983) have argued that it is self-referential worry which detracts from attentional processes. Studies with tests anxious students have indicated that cognitive modification treatments that teach subjects to become cognitively aware of their anxiety-provoking self-statements are effective. Students use anxiety as a cue to stay on task and improve

performance, and to reduce the anxiety (Meichenbaum & Cameron 1974; Richardson, O'Neil, & Grant, 1977). Wine (1971) has suggested that insight procedures which concentrate on making subjects aware of their anxiety-provoking self-statements are ineffective in reducing test anxiety unless practice in the use of positive self-talk is added to the treatment intervention.

A major issue concerning effectiveness of the types of techniques taught in this module is that of perception of control. McCombs (1982) has stated that cognitive modification approaches are successful partly due to increasing student's perceptions of the amount of control they have over situations or events and their own feeling of responsible self-control. Even for events that are objectively determined by chance, subjects often develop an illusion of control over the outcome (Langer, 1978; Langer & Rodin, 1975), and people who have some control over their environment have been shown to perceive their own mood as more positive (Rodin, Solomon, & Metcalf, 1978). Miller, Rosellini, and Seligman (1977) have speculated that when faced with an aversive situation, if it is perceived as controllable then a subject's anxiety disappears, if a subject is uncertain about controllability anxiety remains, and if a subject perceives it as uncontrollable, depression emerges.

The literature supporting the value of progressive muscle relaxation is vast (e.g., Richardson, 1976; Rimm & Masters, 1979). Relaxation is frequently used for generalized anxiety, neck and back pain, and headache. It is uncertain at this point how effective this procedure will be when presented on videotape. Audiotaped progressive muscle relaxation sessions have been shown to be inferior to live presentation (Paul & Trimble, 1970). It is unlikely that deep muscular

relaxation will take place while students watch the tape, or in the instructional setting. However, there are two reasons for including this procedure in the module. First, students who are very tense and anxious most of the time may benefit from this procedure, since they will be encouraged to practice it when they are alone. Second, a short form (four major muscle groups) of the sixteen muscle groups used in complete progressive muscle relaxation instructions will be presented. At times throughout their basic skills lessons, students will be prompted to use this short form as both a way to stretch if muscles are cramped from sitting in front of the terminal for long periods, and as a way to relax.

Module 3: Reading Comprehension

The character for this module has not yet been chosen, as the module is in the beginning stages of development. Three types of metacognitive knowledge about reading will be presented in this module. The first is how to select reading strategies, the second is how to use reasoning skills to help interpret passages, and the third is recognition and remediation of comprehension failure. In the JSEP population, it is quite likely that students may not possess the awareness that different reading strategies should be employed for different types of text and that different learning strategies may produce different learning tasks. Several investigators have found that different strategies may produce different learning outcomes, evaluated in terms of both informational density, internal connectedness, and connectedness with prior knowledge (e.g., Cook & Mayer, 1983). A basic assumption underlying the learning strategy hypothesis is that different learning outcomes exact different prices in terms of time and

processing resources. It would therefore follow that an intelligent reading strategy should begin with an awareness of the reading goal, and then an analysis of possible cost-benefit tradeoffs can be made by selecting a goal-directed strategy.

In a similar fashion of goals influencing deliberate choice of strategy, the type of text being read should also influence choice of strategy. Jones (1983) advocates teaching students to recognize different text conditions as a basis for strategy selection. For example, "explicit text," which the reader can understand without difficulty and without relying on outside sources or an expert base of prior knowledge, generally calls for strategies such as mnemonic-like encoding and retrieval. Comprehension for "explicit" or "inadequate" text conditions may require reasoning and constructive strategies that combine incoming text information with prior knowledge and/or information from other sources.

The concept of metacognition, which will also be emphasized in the memory module, will be introduced in this module. A person's self-awareness of being a reader that actively processes information and constantly makes inferences, formulates hypotheses, ventures predictions, and draws conclusions about meanings within text passages will be emphasized. Collins and Smith (1983) have developed a method for instructing students to use clues in text to make hypotheses about what is happening or likely to happen next in a passage, evaluate these predictions as they continue reading, and revise them if necessary. Similarly, Schank and Black (1982) have developed a CAI instructional system in the form of a game that incorporates prediction. Subjects take the role of a character, and at points throughout the lesson

subjects are asked what their character should and would do in a certain situation.

Finally, an important goal of this module will be instruction in awareness of comprehension failures (failure to realize when you do or do not know something, as well as failure to realize when you do know something and may stop reviewing it). Techniques such as self-questioning and self-directed summarization (Palincsar & Brown, 1983) will be taught as strategies for awareness of comprehension failure.

Module 4: Developing skilled Memory

It is now well established by an overwhelming number of studies that employing memory strategies such as rehearsal, elaboration, or organization can facilitate retention of material to which they are applied (e.g., Atkinson & Raugh, 1975; Butterfield, Wambold, & Belmont, 1973). Since prior research has suggested that soldiers often do not see the relevance of learning strategies to use with the content material to be learned (Weinstein, Underwood, Wicker, & Cubberly, 1979), an introduction and explanation of metamemory and active learning will precede instruction of actual memory strategies. "Mem," a personal computer cartoon character will introduce JSEP students to the concept of being programmed to store information in order to remember the material.

Students will be trained in three types of memory strategy skills: strategies for learning single terms and ideas (e.g., defining a word, creating a sentence with a vocabulary word); strategies for lists (e.g., sequence chaining, self-testing); and strategies for connected discourse (e.g., key idea analysis, paraphrasing).

Similar to comprehensive training programs that have been developed by other researchers (Dansereau, 1978; McCombs, 1981; Weinstein, Underwood, Wicker, & Cubberly, 1979), the JSEP memory module will incorporate a wide variety of memory strategies with sufficient practice and training to accommodate individual differences and to facilitate flexibility of usage and generalization. Since this module will be extensive in the scope of the strategies presented, and in information provided about their use, attempts will be made to draw on prior knowledge of the student population. An example of this would be using the military's phonetic alphabet to illustrate the pegword strategy.

One of the most important goals of the memory module instruction is to induce strategy transfer. Some procedures that can facilitate both maintenance and generalized application have been established, although more research needs to be done in this area. One technique that has already been mentioned is that of training instruction on the concept of metamemory (Brown, Campione, & Day, 1980). Also, extensive and varied practice appears to be a necessary component for transfer of memory skills (Weinstein, 1978). Training should first begin with near transfer practice examples which encourage and facilitate the use of a target strategy, with a gradual move toward practice situations that represent less desirable processing conditions (Waters & Andreassen, 1983).

Module 5: Problem Solving

The goal of this module is to teach a cognitive strategy, that of how to construct or chose a way of solving a problem. In effect, the students will be taught a strategy to select component strategies. A

four step plan for solving both well-defined academic type problems, and vague, poorly defined problems will be taught in this module by a detective, `a la Sherlock Holmes. The four steps are termed the "four C's" of problem solving: (1) clarify the problem; (2) choose a solution; (3) carry out the best solution; and (4) check your answer. These four steps are those used by Polya (1957, 1968) for solving mathematical problems, and were chosen based upon recommendations by Richard Mayer (1984, personal communication). Each of the "four C" steps will include a rationale for the step, and strategies for solving well defined and poorly defined problems. For example, in the first step of clarifying the problem, students will learn that they can draw a diagram, restate the problem, identify the goal, think of novel ways to organize the problem, or eliminate irrelevant information. Students will practice tying the steps together by being presented with a large number of practice items. Greeno (1978) has suggested that more complex processes are most certainly used in solving poorly defined problems than are needed for solving simple, well-defined problems. However, there seems not to be a basic difference in the principles of problem solving for these separate domains. Once the student solving the problem has made the poorly defined problem clear or well-defined, the procedures for solving the problem are then the same as for a well-defined problem. In the JSEP curriculum, the students will be taught to distinguish both types of problems, how to use the presented strategies for each type of problem and, if appropriate, specific strategies for each type.

The teaching of a few general strategies, without delineating a systematic plan for self-managing the problem solving process, appears

to result in a failure to generalize these general strategies to other subject areas. For example, in a review of 114 studies, Belmont and Butterfield (1977) stated that none of the studies involved subordinate processes and none resulted in generalized cognition. Belmont, Butterfield, and Ferretti (1983) found that when subordinate processes using systematic steps were taught, generalized cognition resulted. The goal of this module is to provide students with a plan for the problem solving process, and the knowledge to carry out the plan, thus possibly leading to the generalization of their problem solving skills. The vast array of problem solving techniques available makes it difficult, if not impossible, to teach them all (Gagne, 1980). Therefore a variety yet limited number of strategies were selected for this module. Anazai and Simon (1979) have indicated that a person may choose and even modify strategies to best fit her or his needs, therefore making it somewhat impossible to teach strategies which will work best for every student. By providing students in the JSEP course a variety of different strategies, it is hypothesized that they will have a choice of strategies that best fit with their cognitive set.

Summary

After the students have completed the five separate learning strategies modules, a brief review unit entitled "Making Your Skills Work Together" will be presented. In this unit the metastrategy, which consists of integrating all five separate steps, will be reviewed as a coordinated activity. The students will be taught to modify the metastrategy to use as a technique for studying at home and for taking tests. Also, the students will be told to view the specific, component strategies as tools to accomplish each

metastrategy step. Students will be encouraged to adopt a somewhat individualized approach, by prompting them to use the specific strategies that work best for them.

The use of the metastrategy technique assumes that JSEP lessons will be somewhat standardized so that they are compatible with the metastrategy. At the very least, the lesson structures and any hidden strategy controls must not operate in conflict with the metastrategy. This is especially important, since during the basic skills lessons which follow the learning strategies curriculum, students will be prompted by the cartoon characters they met during the learning strategy modules.

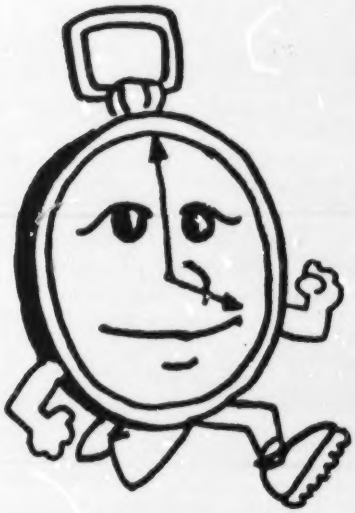
The prompting system will now be described in more detail, using the mood management module as an example. First, as mentioned in the description of this module, students will meet the "Coach," the cartoon character that teaches the mood management module. For each separate, component strategy which the coach teaches, a picture of the coach in a certain position will be presented (see Appendix A). Then, during basic skills lessons, what is termed a light prompt will appear. These prompts will be inserted where lesson designers feel a particular strategy should be used by a student taking the lesson. The light prompt consists of just the picture of coach in a position that represents to the student a specific, component strategy taught during the mood management module. If the student is having difficulty remembering the specific strategy prompted by the light prompt, he or she can press a key on the computer for a heavy prompt. The heavy prompt includes the picture given on the light prompt, along with a printed description or example of the strategy technique being

prompted. Also, at any time, students taking basic skills lessons may return to any of the learning strategies modules for review.

Dansereau (1978) has used a metastrategy acronym mnemonic, but the use of a visual mnemonic technique consisting of a set of cartoon characters has not, to our knowledge, been attempted. A major research question stemming from this model is whether or not the addition of an introductory course, metastrategy training, embedded prompts, or some combination of these enhances learning over and above what is attained from well designed (e.g., Gagne & Briggs, 1974) instruction.

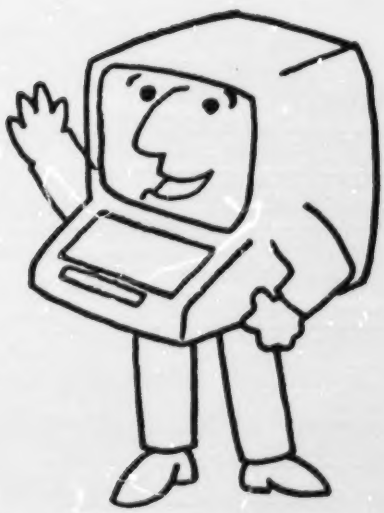
APPENDIX A

JSEP Learning Strategies Characters



Clock
Setting Goals and Self-Pacing

"Coach"
Mood Management



"Mem"
Developing Skilled Memory

Detective
Problem Solving

Mood Management Light Prompts

Positive Self-Talk

Muscle Relaxation

Coping Imagery

Slow Deep Breathing

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